some hut, where for several days they will perform musical ceremonies before it, and then the saint will be brought back to its proper altar'—and again, 'they come from afar to make offerings of blossoms and leaves, light candles before the altars of those saints they wish to honour, and then silently return to their huts.'"

There can be little doubt that in pre-Christian times they were accustomed to an elaborate ritual, and it was partly for this reason that they took so readily to the ceremonies of the Roman Church, but they never quite abandoned their old beliefs. The twenty-four years that have elapsed since Admiral Brine's journey have not made much difference in this respect; and little rough altars may any day be found on the tops of abandoned temple mounds with the scent of incense still hanging about them.

Admiral Brine camped for a few days in the ruined temples at Palenque, and then travelled northwards to Yucatan and visited the ruins of Uxmal. The last two chapters give an interesting summary of the author's notes and the conclusions to which he has come. With these conclusions it is not always possible to agree; but that is not much to be wondered at, when dealing with a subject which is so closely enveloped in mystery as the civilisation and migrations of the races of America.

Happily we can feel assured that a distinct advance in our knowledge of the subject is being made, and that there is a fair prospect that, within the next few years, some at least of the mystery will be rolled away.

A good example of the very careful work which is being done by numerous scientific societies in America, in collecting and examining prehistoric remains, can be seen in Mr. Clarence B. Moore's account of his excavations in the sand mounds of the St. John's River in Florida, and Mr. W. H. Holmes's notes on the pottery from these mounds, which was submitted to him for examination, both published in the *Journal* of the Philadelphia Academy of Sciences.

The sand burial mounds occur frequently in the neighbourhood of large shell deposits. They are usually stratified, the layers consisting of different coloured sand, with sometimes a slight admixture of shell, and the human bones and other objects are most frequently found in a layer of sand of a pinkish colour, due to the presence of powdered hematite.

It is not unusual to find in Indian burial mounds pottery which has been purposely broken before burial, as though in observance of some ceremonial rite, but in these sand mounds Mr. Moore found mortuary pottery in which the breakage or perforation had been made before the pottery was fired.

With some of the surface and intrusive burials were associated iron and brass objects, showing them to have been post-Columbian; but nothing indicating contact with Europeans was found associated with the deeper interments, and many of the mounds were entirely free from evidence of contact with white men.

At Thursby Mound a number of very curious rough pottery figures were found, representing squirrels, turkeys, fish, turtles, &c., as well as some vegetal forms, which are extremely rare in the normal art of the United States. The illustrations which accompany these notes are numerous and excellent.

As we hear that Mr. W. H. Holmes, whose admirable work is so well known, is leaving the Bureau of Ethnology at Washington, in order to take charge of the new and liberally endowed museum at Chicago, which is the outcome of the great World's Fair, we may look for steady and increasing contributions to our knowledge of the Indian races and their arts, which will not be limited to the result of investigations in the territory of the United States, but will include the whole American continent.

The Peabody Institute of Massachusetts (principally owing to the liberal support afforded it by Mr. C. Bowditch, of Boston) has been able to set a good example in commencing systematic work on the central civilisations, by the investigations now being carried on at the ruins of Copan, the site of which has been acquired on lease from the Government of Honduras for a period of ten years. The Peabody Museum at Cambridge, with its fine collections of pottery, original sculpture and casts, is fast becoming a centre for the study of American antiquities.

WATTS' DICTIONARY OF CHEMISTRY.

Watts' Dictionary of Chemistry. Revised and entirely re-written. By M. M. Pattison Muir, M.A., and H. Forster Morley, M.A., D.Sc. Assisted by eminent contributors. Vol. IV. With Addenda. 8vo. Pp. 922. (London and New York: Longmans, Green, and Co., 1894.)

THE completion of the grand work before us renders it possible to form a fair estimate of its features and its general character. No candid reader can fail to appreciate the industry displayed by the editors and contributors, in bringing together and sifting out the vast mass of existing matter, in a science which is experiencing so rapid a growth. Perhaps a greater difficulty has been encountered in compressing within reasonable limits the facts which must claim insertion. This end has been reached by a style laudably laconic, but at the same time free from obscurity, and by an ingenious system of abbreviations, the editors—or we might better say the authors, since the entire work has been re-written—have confined themselves to the pure science, leaving its thousand and one applications in manufactures, metallurgy, and agriculture, to be dealt with in the "Dictionary of Applied Chemistry," issued by the same publishers. Without this limitation, the cost of producing the work would have been simply prohibitive.

Many of the articles included in this volume are, in their value and extent, almost worthy to rank as independent works. As instances we may mention the section on the Proteids; that on the Ptomaines—which might have been a little more extensive—the article on Phosphorus; and, above all, that on the Physical Methods used in Chemistry. This article, which extends to 100 pages, treats separately of methods based on capillarity, of crystallographic methods, of dialysis and diffusion, of dynamical methods, of electrical methods, of procedures based on the freezing-points of solutions, of optical methods, of methods based on osmotic pressure, of photographic methods, of methods turning on the specific

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heats of solids, of thermal methods, of those based on the vapour-pressures of solutions, of the viscosity of liquids, and of methods based on volume-changes.

The chapter on electrical methods is supplied by Prof. Dr. Ostwald, of the University of Leipzig. The author gives an account of the rise of electro-chemistry and of its development by Berzelius and Hisinger, and of its dominance down to 1840. It is remarked that, after his first investigations, Berzelius did not undertake any experimental work on the action of electricity upon chemical compounds. After 1840 this theory was found incapable of explaining facts which were being brought to light in the region of organic chemistry, whilst its physical foundations were shaken by the researches of Faraday. More recently, Hittorf, Arrhenius, Helmholtz and others have founded a new electro-chemical theory. Mention is made of the discussion—not yet decided—as to the origin of the current in the pile. The conception of ions as the material conveyance of the current has been gradually introduced since the researches of Clausius, and is taken into account in our views of decomposition. Not less interesting is the account of optical methods. The first part, from the pen of Mr. G. Gladstone, discusses refraction and dispersion; the second, on spectroscopic methods, is contributed by Prof. W. N. Hartley, F.R.S.; and the third part, on the rotation of the plane of polarisation of light, is by Prof. Pattison Muir. In the part treating of the spectroscopic methods we find studies of the infra-red and ultra-violet absorption spectra, with notices of the researches of V. Schumann, Waterhouse, Crookes and Gladstone. In connection with the absorption spectra —a subject by no means fully explored—we have a notice of Witt's views on the cause of colour in organic compounds.

Among the elements admitted or supposed, we find in this volume, notices of phosphorus, platinum, potassium, rhodium, rubidium, ruthenium, samarium, scandium, selenium, silicon, silver, sodium, strontium, sulphur, tantalum, tellurium, terbium, thallium, thorium, tin, titanium, tungsten, uranium, vanadium, yttrium, ytterbium, zinc and zirconium, with compounds or derivatives.

The authors and contributors are noticeable for a sobriety of statement; they do not indulge in premature conclusions and in speculations for which evidence is lacking.

As regards the elements, the Mendelejeff classification is adhered to, and in the accounts of their preparation the recent results of Moissan have not been overlooked.

The addenda comprise facts in mineral chemistry which have been observed since the appearance of Vols. I., II., and III. and the printing off the final proofs of the present volume. The addenda include nothing on organic chemistry; since to have noticed the recent discoveries in that department would, in the opinion of Mr. Pattison Muir, have required the addition of many hundred pages.

On comparing the present work with former dictionaries of chemistry, whether in English or in any other language, its superiority will appear beyond all question. It will be the obvious duty of all universities, colleges, &c., at once to add this new edition of "Watts" to their libraries.

DISEASES OF TREES.

Text-Book of the Diseases of Trees. By Prof. R. Hartig, of Munich University. Translated by W. Somerville, Professor of Agriculture and Forestry, Durham College of Science, Newcastle. Revised and edited by Prof. H. Marshall Ward, F.R.S. (London and New York: Macmillan and Co., 1894.)

"DER Lehrbuch der Baumkrankheiten von R. Hartig" has now appeared in English with all the admirable illustrative plates of the second edition, except the coloured plates at the end of the book, which represent spruce and oak wood decomposing under the influence of different fungi, and are therefore somewhat exterior to the proposed scope of the work, "the diseases of trees." The original, as Marshall Ward states in the preface to the present version, owes its great charm "to the simple method of exposition of the facts and principles conveyed, as well as to the astounding richness of the information it contains. This is unquestionably owing to Hartig's prominence as the leading investigator and authority on the fungoid diseases of forest trees."

The great superiority of Hartig's work in this subject has been acknowledged in France, by the publication there, in 1891, of a French translation by Profs. Gerschel and Henry, of the Nancy Forest School, which was entirely revised by the author.

Prof. Somerville, the translator of the present English edition, has followed a complete course of forestry at a German forest school, and has been for some time engaged in forestry instruction at Edinburgh and Newcastle. He has already written a valuable little book on the structure of European timbers. The translation of Hartig's book follows the original closely, and is smooth and free from Germanisms.

The editor, Prof. H. Marshall Ward, whose qualifications for the work need no comment, has written an excellent preface, besides revising the translation and supplying short foot-notes in explanation of all scientific terms, which might puzzle readers who have not studied vegetable physiology very deeply, and in a few cases giving his own opinion where he does not coincide with the authors.

In the preface, the bold but thoroughly justifiable statement is made that students of agricultural chemistry, or of the physics and chemistry of soils, must thoroughly master the facts of the structure and essential phenomena of life by experimental investigation, and that the chemistry of the soil taken alone is of less practical importance. The fact is, that although the want of sufficient suitable chemicals in a soil may render certain tree-growth stunted and unproductive, yet the physical nature of the soil, *i.e.* its degree of division and hygroscopicity, and the climate of the locality, are more important than the former to ensure a healthy and vigorous tree-growth; whilst a good coating of decomposing dead leaves will render a soil, which is chemically and physically poor, capable of producing a fair crop of timber. The influence of earthworms on soils has been dealt with by Darwin, whilst that of bacteria and other low organisms in decomposing organic débris to form

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